

## **Subsurface Investigation Work Plan**



*Dated:*

**May 1, 2006**

*Site:*

**Reveles Property  
1503 South Main Street  
Fortuna, California 95540**

**LOP # 12224**

*Prepared for:*

**Anastacio Reveles**

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## 1.0 EXECUTIVE SUMMARY

At the request of Anastacio Reveles, the current property owner, SounPacific Environmental Services (SounPacific) has prepared this *Subsurface Investigation Work Plan (Work Plan)* to install additional monitoring wells for the ongoing groundwater assessment and inclusion in the ongoing groundwater monitoring program at 1503 South Main Street, Fortuna, California (Reveles Property). Previous subsurface investigations have identified groundwater contamination at the location of the former gasoline USTs and in the area northwest of the former USTs. During the recent investigation, SounPacific attempted to drill and install three (3) monitoring wells in order to assess any soil contamination at the Reveles Property (the Site) and evaluate the groundwater quality and calculate an accurate groundwater gradient and flow direction. Assessment of the soils did not identify any soil contamination of concern, however, due to subsurface conditions that caused drilling refusal, it was only possible to install one (1) groundwater monitoring well. Therefore, SounPacific proposes a subsurface investigation to install five (5) additional monitoring wells, with sing air rotary drilling, and incorporate them into the ongoing groundwater monitoring program. A summary of proposed work is outlined below.

- SounPacific proposes a subsurface investigation at the Site to install five (5) additional groundwater monitoring wells for the purpose of calculating groundwater flow gradient and direction and to monitor and assess groundwater contaminant levels and contaminant migration over time. Following the initial groundwater sampling of the new wells, the wells will be incorporated into the ongoing groundwater monitoring program.
- Using the collected data in cooperation with the data from the previous investigations, a Report of Findings (RoF) will be prepared. The RoF will document the activities and findings of the proposed investigation. All wells will be surveyed according to Geotracker survey guidelines. All analytical results, boring logs, and monitoring well location data will be uploaded to the Geotracker database.

## **2.0 INTRODUCTION**

In a letter dated February 16, 2006, Humboldt County Division of Environmental Health (HCDEH), concurred with SounPacific's recommendation for the installation of a monitoring well in the area of the former USTs and dispenser islands at the Reveles Property located in Fortuna, California. In addition, HCDEH recommends the installation of an additional (third) monitoring well to the northwest of the former USTs. Also, more wells are being proposed to allow a fuller assessment of the property. This Work Plan presents the proposed scope of work related to the installation of the new monitoring wells

### **2.1 Site Location**

The Reveles Property is in the southeastern section of the city of Fortuna, on the southeast corner of Mill Street and South Main Street. The Site is located in the former town of Rohnerville, at a physical street address of 1503 South Main Street, in Fortuna, California (Figure 1).

### **2.2 Site Description**

The Site consists of a small, non-residential, single-story building in the center of the property that is used as an office and a shop/garage. The area between the building and the road is predominantly paved with asphalt and patches of concrete (Figure 2). The remainder of the Site is either unpaved or covered with gravel. The eastern portion of the Site is undeveloped and at a higher elevation than the rest of the Site. The Site is serviced by public utilities.

The surrounding land use is predominantly residential, with some commercial properties and undeveloped areas. Commercial buildings are located northwest of the Site, and some undeveloped areas are located northeast of the Site.

## **2.3 Topography**

Regional and local topography slopes gently to the west and northwest, however, grading at the Site has resulted in the western portion of the Site to be relatively level. The Site elevation is approximately 170 feet above mean sea level (Figure 1).

## **2.4 Hydrogeologic Setting**

The Site is located in the Mill Creek watershed near the back edge of an uplifted river terrace. The Quaternary Hookton Formation has been deeply incised at this location and the Site has been covered with Quaternary river gravels. A previous subsurface investigation indicated that this Site is underlain by gravelly to extremely gravelly clayey sands to sandy clays and silts. Gravels are well rounded and range in size from pea gravel to cobbles.

Previous investigations at the Site have determined that the presence and depth of groundwater is inconsistent and variable. As a result, only one well has been installed at the Site, for which three monitoring events have been conducted. In these monitoring events the depth to groundwater has ranged between 4.40 feet and 6.60 feet below the top of casing.

A portion of the Site was developed by cutting into the toe of the slop adjacent to the Site (Figure 2). The southeast portion of the Site appears to be developed on native material, whereas the northern portion of the property may be on partial fill. The Site slopes gently towards Mill Creek, which is located to the north of the Site; however, grading activities have leveled the majority of the Site.

## **2.5 Current Site Usage & UST History**

The Site is owned by Anastacio Reveles, who is the responsible party for the investigation and remediation of the property. The building on the property is currently used as an auto repair shop and for storage. In January 1990, the UST system at the Site was removed. The UST

system included two (2) 4,000-gallon unleaded gasoline USTs and one (1) 2,000-gallon waste oil UST located in separate excavations, and their associated product and vent lines.

### **3.0 PREVIOUS INVESTIGATIONS**

A file review conducted at the HCDEH and previous studies overseen by SounPacific indicated the following historical information:

#### **3.1 1990 UST Removal (Beacom)**

The UST system that included two (2) 4,000-gallon unleaded gasoline USTs and one (1) 2,000-gallon waste oil UST was removed from the Site, under permit from the HCDEH, in January 1990. At the time of removal, holes were observed in the USTs and a hydrocarbon odor was present in the excavation pit. Following the removal of the USTs, HCDEH staff collected a soil sample from the ends of each former UST location for laboratory analysis. Laboratory analysis of the soil samples did not report the presence of any total petroleum hydrocarbons (TPH); however, toluene and xylenes were reported in all six samples at concentrations less than one (1) ppm (see Table 1). Groundwater samples were collected from the gasoline and waste oil UST excavation pits. Laboratory analytical results of the groundwater reported TPH in the gasoline range in the gasoline UST excavation, but no long chained hydrocarbons were reported from the waste oil UST excavation. Benzene, toluene, and xylenes, were reported in the groundwater from both excavations, and ethylbenzene was present in the gasoline excavation (Table 2).

HCDEH staff filed an Unauthorized Release Form with the California Regional Water Quality Control Board-North Coast Region (NCRWQCB). In a letter dated February 28, 1990, the NCRWQCB requested a hydrogeologic assessment to determine the threat and/or impact to groundwater.

### 3.2 2001 Subsurface Investigation (SounPacific)

On November 12 and 13, 2001, SounPacific installed eight (8) soil borings (B-1 through B-8) (Figure 3), in which temporary wells were scheduled to be installed and sampled. Due to consistent drilling refusal prior to reaching groundwater, it was only possible to install one (1) temporary well (TW-1) at soil boring location B-5 (Figure 3). This issue was discussed with HCDEH on November 13, 2001, and an additional boring was drilled for the installation of an additional temporary well (TW-2) (Figure 3). Twenty-three (23) soil samples were collected, of which three (3) reported TPH as gasoline (TPHg), and only one (1) reported a concentration in excess of 100 ppm (Table 2). Groundwater analysis reported TPHg (33,000 ppb and 18,200 ppb in TW-1 and TW-2, respectively), along with elevated levels of BTXE and fuel oxygenates in both groundwater samples (Table 2).

In a letter dated November 5, 2002, HCDEH requested a work plan be prepared to conduct further subsurface investigation and conduct a sensitive receptor survey. In the same letter, HCDEH required that in order to evaluate the Site's potential for natural attenuation, additional biodegradation indicators would need to be monitored. On April 2003, SounPacific submitted a *Site Characterization Work Plan*, which presented monitored natural attenuation as an interim remedial alternative to monitor the hydrocarbon degradation at the Site. HCDEH did not approve this *Work Plan* and requested that a site conceptual model be developed and the *Work Plan* be expanded to investigate the source for the observed contamination in the groundwater. In a subsequent letter dated June 15, 2004, HCDEH requested that the revised *Work Plan* focus on delineating the soil contamination and gathering information regarding the identified groundwater plume. A *Subsurface Investigation Workplan Addendum*, which included the installation of monitoring wells and initiating a quarterly groundwater monitoring program was submitted in January 2005 and approved by HCDEH in a letter dated February 24, 2005.

### 3.3 2005 Subsurface Investigation (SounPacific)

On September 6, 2005, SounPacific staff performed a subsurface investigation at the Reveles site to investigate the source of the groundwater contamination and delineate the extent of the soil



and groundwater contamination. All investigative work was performed in accordance with the approved SounPacific *Subsurface Investigation Work Plan Addendum (Addendum)*, dated January 20, 2004 and additional modifications approved by HCDEH. The investigation consisted of drilling three (3) onsite soil borings (MW-1, MW-2, and MW-3) for soil classification and both soil and groundwater sample collection (Figure 3). Twenty four (24) soil samples were collected and analyzed, of which one (1) sample reported TPHd and TPHmo, three (3) samples reported concentrations of lead, and all samples reported concentrations of chromium, nickel, and zinc (Table 2). According to the approved *Addendum*, the proposed borings should have been converted into groundwater monitoring wells; however, as groundwater was only encountered in borehole MW-2, it was the only borehole that was converted to a monitoring well.

On September 7, 2005, Fisch Environmental drilled three step-out borings (SB-1 through SB-3) for an additional attempt to investigate the groundwater depth at the Reveles Site (Figure 3). These step-out borings were drilled to depths of approximately 30 feet bgs. The drillings were discontinued due to drill refusal resulted by extremely rocky condition in the subsurface. No groundwater was encountered in any of the step-out borings.

### **3.4 Groundwater Monitoring (SounPacific)**

Following the installation of the Site groundwater monitoring well, the well was subjected to an initial well sampling event, followed by two (2) subsequent rounds of groundwater monitoring. The groundwater monitoring has not reported any TPHg, BTXE, or fuel oxygenates, however, some long chained hydrocarbons have been reported during various sampling events, along with some heavy metals. Data from the groundwater monitoring is included in Tables 3 and 4.

## **4.0 GROUNDWATER CONTAMINATION ASSESSMENT PLAN**

### **4.1 Investigation Objectives**

Groundwater impacted with petroleum hydrocarbons has been identified in the vicinity of the former gasoline USTs and in the area to the northwest of the former USTs and dispenser areas. The 2005 subsurface investigation was unsuccessful at installing the proposed minimum of three (3) monitoring wells to assess the subsurface groundwater contamination and calculate an accurate groundwater gradient and flow direction. In addition, the ongoing groundwater monitoring has not confirmed the groundwater contamination identified in grab groundwater samples. Therefore the objectives of the proposed investigation are as follows:

- Install adequate groundwater monitoring wells to determine the groundwater flow and gradient at the Site.
- Collect groundwater samples to further evaluate the level, distribution, and migration of groundwater contamination.
- Be able to track contaminant concentrations throughout a full hydrologic cycle in the areas of concern, including, upgradient and cross gradient areas.

### **4.2 Proposed Scope of Work**

To evaluate the distribution of petroleum hydrocarbons in the groundwater, SounPacific proposes the drilling of five (5) soil borings (MW-1, MW-3, MW-4, MW-5, and MW-6) that will be converted into groundwater monitoring wells. The new monitoring wells will be added to the on-going groundwater monitoring program. Details regarding the activities associated with the drilling, well installation, and sampling are presented on the following page.

### **4.2.1 Well Locations**

To assess the groundwater contamination at the Site it is proposed to install five (5) new groundwater monitoring wells onsite to assist existing well MW-2 with the Site characterization. The rationales and objectives for the proposed monitoring wells are presented below. One of these wells (MW-1) will be located at the Site of the former gasoline USTs. However, it should be noted that the location of the borings are subject to change based upon the presence of underground utilities. The proposed locations for the proposed borings are shown in Figure 4.

#### **Proposed Monitoring Well PMW-1**

Proposed monitoring well PMW-1 is located in the area of the previous gasoline UST system and dispenser islands. This monitoring well will clarify the groundwater data from previous temporary well TW-2 that reported significantly elevated levels of TPHg (18,200 ppb), BTXE, and MTBE. The well data will also provide analytical data for the contamination source area, as well as seasonal water levels, to assist in the determination of the groundwater gradients and groundwater flow direction.

#### **Proposed Monitoring Well MW-3**

Proposed monitoring well PMW-3 is located up-gradient (based on surface topography) and to the east of the former gasoline UST system. The proposed location is also adjacent to previous soil borings B-1 and MW-1. This monitoring well will provide background analytical data upgradient from the suspected source (the previous gasoline UST system) as well as seasonal water levels, gradients, and directions of groundwater flow.

**Proposed Monitoring Well PMW-4**

Proposed monitoring well PMW-4 is located cross-gradient (based on surface topography), to the southwest of the previous UST system and adjacent to the southern corner of the property. This monitoring well will provide analytical data for the southern portion of the Site, and determine a cross-gradient extent of the contamination. Data from the well will also assist in the determination of seasonal water levels, groundwater gradients, and directions of groundwater flow.

**Proposed Monitoring Well PMW-5**

Proposed monitoring well PMW-5 is located down-gradient (based on surface topography), to the west of the former gasoline UST system and in the vicinity of previous temporary well TW-1, which reported significantly elevated levels of TPHg (33,800 ppb), BTXE, and MTBE. This monitoring well will provide analytical data to clarify the data reported from TW-1, as well as seasonal water levels, groundwater gradients, and directions of groundwater flow. This monitoring well was recommended by HCDEH.

**Proposed Monitoring Well PMW-6**

Proposed monitoring well PMW-6 is located cross-gradient (based on surface topography), to the north of the former gasoline UST system. This monitoring well will provide analytical data for the northern portion of the Site, and determine a cross-gradient extent of the contamination. Data from the well will also assist in the determination of seasonal water levels, groundwater gradients, and directions of groundwater flow.

**4.2.2 Well Bore Drilling and Sampling**

Based on the existing well at the Site, all well borings will be drilled to a depth of approximately 18 feet bgs. The drilling will be conducted with a mobile drill rig using air rotary drilling technology by a State-licensed (C-57) driller. Air rotary drilling is being proposed to address the rocky and consolidated material that prevented hollow-stem augers from penetrating to the desired depth during previous attempts at the Site to install monitoring wells. However, the actual depth will be determined in the field based on the depth of first groundwater with a boring

being terminated approximately ten (10) feet below the water table. All well borings will be logged by a qualified geologist, who will prepare a graphic depiction of the soil strata in accordance with USGS standards. Drill cuttings and any obtained soil samples will be visually inspected in the field and documented by the project geologist for lithologic documentation of soil condition and classification using Unified Soil Classification System guidelines.

The use of air rotary as a drilling technology, may eliminate the ability to collect suitable soil samples for laboratory analysis; although, as previous analytical results indicate that no soil contamination of concern is present at the Site, this may not be a need to collect soil samples. However, soil samples of the drilling cuttings will be collected at five-foot intervals starting at a depth of five-feet bgs in all borings except PMW-1; where sampling will commence at the base of the former UST excavation. Samples of drilling cuttings will be collected in laboratory supplied six-ounce jars, labeled, and handled in the manner outlined below. All soil samples and drilling cuttings will be subject to field screening that will include headspace analysis using a portable organic vapor analyzer (OVA) and visual inspection. Based upon the results of the field screening, a minimum of one (1) and a maximum of two (2) soil samples will be selected for laboratory analysis. Other collected soil samples will be placed on hold pending the initial analytical results.

If possible, soil samples will be collected using a split-spoon sampler, lined with pre-cleaned brass or stainless steel tubes, that is advanced using a drive hammer in front of the hollow stem augers. Following collection, the ends of the tubes will be sealed and the tube appropriately labeled. The sample is then placed in a plastic bag on ice in a cooler for shipment to a state certified laboratory, under a chain-of-custody record.

### 4.2.3 Soil Analysis

All soil samples selected for laboratory analysis will be analyzed for TPHg, BTXE, five fuel-oxygenates by **EPA Method 8260B**, and TPHd and TPHmo by **EPA Method 8015m**. All laboratory analysis of soil samples will be conducted on a normal turnaround basis by Basic Laboratories of Redding, California (DHS Cert # 1677).

#### **4.2.4 Monitoring Well Construction**

Following the completion of the drilling and soil sampling activities, all five proposed borings will be converted into groundwater monitoring wells (MW-1, MW-3, MW-4, MW-5, and MW-6). Based on historical groundwater level data, the maximum well depth is not anticipated to exceed 18 feet bgs. However, actual well screen placement and total depth will be based on groundwater level measurements encountered in the field, with each well boring being extended approximately ten feet below the groundwater table.

Each monitoring wells will be constructed of two-inch diameter, clean, flush-threaded, two-inch diameter PVC well materials. The well screen itself will not exceed 15 feet in length and will consist of 0.02-inch machine cut slots. In each well, a filter pack of #2 1/2 sand will be placed in the annular space between the well casing and boring walls, and extend from the bottom of the boring to approximately 0.5 feet above the screened interval. Following placement of the sand filter pack, each well will be surged with a surge block in an effort to settle the sand pack. Once field observations indicate that the sand pack has settled, the filter pack will be sealed by a one-foot layer of hydrated bentonite. The remaining annular space will be filled with cement bentonite grout, and surface construction of the wells will be completed with a locking, waterproof, flush mount, traffic-rated cover or a locking steel monument. A schematic of the proposed monitoring well is included as Figure 5. Some deviation of the well construction may occur based upon groundwater level measurements at the time of drilling.

Following the installation of the wells, a licensed surveyor will determine the elevation and location of each monitoring well at the Site to a status datum point according to Geotracker specifications and as required by the NCRWQCB. All data will be entered into the Geotracker database using the new x, y, z coordinate system. Proposed monitoring well construction details are shown in Figure 5.

#### **4.2.5 Monitoring Well Development and Groundwater Sampling**

Within 72 hours of the installation of the wells, each well will be developed using a purge pump or equivalent equipment. Well development will continue until all fines are removed and no

turbidity is visually present. A minimum of ten (10) well volumes will be removed during the developing process, unless the well goes dry, at which time well development will cease. During development, pH, conductivity, and temperature of the extracted water will be tested at regular intervals to verify that representative samples of formation groundwater are present in the well.

Following well development, the wells will be allowed to recharge a minimum of 24 hours prior to sampling. The first sampling event (Well Installation Sampling Event) will be conducted at this time. Groundwater levels will be measured prior and during the well purging. Three (3) well volumes of groundwater will be purged from the wells, during which pH, conductivity, temperature, and turbidity values will be collected on a regular basis to ensure representative formation waters are sampled. Groundwater samples will be taken from the wells with disposable PVC bailers or a peristaltic pump, stored in appropriate containers (i.e. VOA vials), placed in coolers with ice, kept at or below four degrees Celsius, and transported to a State certified laboratory under chain-of-custody documentation for analysis. If any well(s) contains free product, the thickness of the product will be measured in the field using a water-hydrocarbon interface meter and no groundwater sample will be collected. In addition, one (1) QA/QC sample, i.e. unmarked duplicate, will be collected and submitted for laboratory analysis.

Following the initial sampling of the new wells, they will be incorporated into the current groundwater monitoring program. Each monitoring event will consist of measuring the depth to groundwater, followed by the purging of the well of a minimum three (3) well volumes, after which the well will be sampled for analysis. During purging activities, the extracted well water will be tested for pH, conductivity, temperature, and clarity for signs of representative formation waters. Groundwater samples will be collected from the wells with disposable PVC bailers or a peristaltic pump, and handled in the same manner as those samples collected during the initial well sampling.

#### **4.2.6 Groundwater Analysis**

All groundwater samples will be analyzed for TPHg, BTXE, five fuel-oxygenates by **EPA Method 8260B** and TPHd and TPHmo by **EPA Method 8015m**. The QA/QC sample will only

be analyzed for TPHg and BTXE. In addition, two (2) groundwater samples (highest and lowest contaminant concentrations) will be analyzed by the laboratory for pH, dissolved oxygen, total dissolved solids, and salinity to evaluate the efficiency of naturally occurring degradation. All laboratory analysis of groundwater samples will be conducted and coordinated on a normal turnaround basis by Basic Laboratories of Redding, California (DHS Cert # 1677).

#### **4.2.7 Site Sanitation Procedure**

All drilling and sampling equipment will be cleaned prior to arriving at the Site, and will be decontaminated between borings and sampling activities. Drill cuttings will be placed on plastic sheeting, and surrounded with a berm to prevent run-off, pending laboratory analysis. If deemed necessary, the stockpiled soil may also be covered with plastic sheeting. A composite sample will be collected from the stockpile and analyzed for TPHg and BTXE. Based upon the analytical results, the disposal of the soil will be determined. Also, prior to leaving the Site, all equipment will be inspected to ensure no wastes are allowed to leave the Site. Rinsate, generated from cleaning sampling equipment, will be contained in a portable washbasin and any other rinsate will be allowed to evaporate onsite.

#### **4.2.8 Site Safety**

All work will be conducted by qualified personnel using Level D PPE. All boring locations will be surveyed by Underground Service Alert (USA) and client records prior to any drilling activities. In addition, each boring location will be hand augured to a minimum of four (4) feet prior to drilling. The area of investigation will be off-limits to the general public, restricted to personnel directly involved with the project, and surrounded by traffic barriers or similar.

#### **4.2.9 Reporting**

Following completion of the field work and receipt of laboratory analytical results a Report of Findings (RoF) will be prepared that document the activities and findings of the investigation. All wells will be surveyed according to Geotracker survey guidelines. All analytical results, boring logs, and monitoring well location data will be uploaded to the Geotracker database.



## 5.0 PROPOSED TIME SCHEDULE

The schedule for the subsurface investigation and excavation at the Reveles Property is as follows:

- Within six (6) week of *Work Plan* approval, subcontractors will be contacted, drilling permits obtained, and the field work implemented.
- The field work is expected to be completed within one (1) week.
- Laboratory analysis will be conducted on a normal turnaround basic, with the laboratory report being received with four (4) weeks of sample submittal.
- Within six (6) weeks of the receipt of the analytical results, the RoF will be prepared and submitted to the HCDEH.

Project implementation dates are subject to agency approval, permitting, and equipment scheduling. If there is a deviation from the proposed schedule, all concerned parties will be notified at least five days before the proposed initiation. A one-week drilling and sampling program is expected. The Report of Findings will encompass the field investigation, present findings, and Corrective Action recommendations regarding future activities at the Site.

## 6.0 CERTIFICATION

This Workplan was prepared under the direct supervision of a California registered geologist at SounPacific. All information provided in this report including statements, conclusions and recommendations are based solely on field observations and analyses performed by a state-certified laboratory. SounPacific is not responsible for laboratory errors.

SounPacific promises to perform all aspects of the work in a manner used by members in similar professions working in the same geographic area. SounPacific will do whatever is reasonable to ensure that data collection is accurate. Please note however, that rain, buried utilities, and other factors can influence groundwater depths, directions, and other factors beyond what SounPacific could reasonably determine.

### SounPacific

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# Tables

**Table 1**  
**Soil Analytical Results**  
Reveles Property  
1503 South Main Street  
Fortuna, California 95540

Sample ID	Sample Location	Sample Date	TPHg (ppm)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	MTBE (ppm)	DIPE (ppm)	TAME (ppm)	ETBE (ppm)	TBA (ppm)	DBE (ppm)	DCE (ppm)	TPHC/oil & grease (ppm)	TPHC/ gasoline (ppm)	TPHC/ diesel (ppm)
#1 East	Waste Oil UST Pit	1/10/1990	----	ND < 0.050	0.060	ND < 0.050	ND < 0.05	----	----	----	----	----	----	----	ND < 250	ND < 1	ND < 1
#1 West	Waste Oil UST Pit	1/10/1990	----	ND < 0.050	0.070	ND < 0.050	ND < 0.05	----	----	----	----	----	----	----	ND < 250	ND < 1	ND < 1
#2 South	Gas Oil UST Pit	1/10/1990	----	ND < 0.050	0.14	ND < 0.050	0.060	----	----	----	----	----	----	----	----	ND < 1	----
#2 North	Gas UST Pit	1/10/1990	----	ND < 0.050	0.25	ND < 0.050	0.080	----	----	----	----	----	----	----	----	ND < 1	----
#3 South	Gas UST Pit	1/10/1990	----	ND < 0.050	0.16	ND < 0.050	0.070	----	----	----	----	----	----	----	----	ND < 1	----
#3 North	Gas UST Pit	1/10/1990	----	ND < 0.050	0.14	ND < 0.050	0.080	----	----	----	----	----	----	----	----	ND < 1	----
SP-5 B-1 @ 5'	B-1	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-1 @ 10'	B-1	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-1 @ 15'	B-1	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-2 @ 5'	B-2	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-2 @ 10'	B-2	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-2 @ 15'	B-2	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-3 @ 5'	B-3	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-3 @ 10'	B-3	11/12/2001	56.3	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-3 @ 15'	B-3	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-4 @ 5'	B-4	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-4 @ 10'	B-4	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-5 @ 5'	B-5	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-5 @ 10'	B-5	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-5 @ 15'	B-5	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-6 @ 5'	B-6	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-6 @ 10'	B-6	11/12/2001	103	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-6 @ 15'	B-6	11/12/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-7 @ 5'	B-7	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-7 @ 10'	B-7	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-7 @ 10' L	B-7	11/13/2001	0.505	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-7 @ 15'	B-7	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-8 @ 5'	B-8	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----
SP-5 B-8 @ 10'	B-8	11/13/2001	ND < 0.060	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.015	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	ND < 0.005	----	----	----

**Table 1 (cont.)**  
**Soil Analytical Results**  
 Reveles Property  
 1503 South Main Street  
 Fortuna, California 95540

Sample ID	Sample Location	Sample Date	TPHg (ppm)	Benzene (ppm)	Toluene (ppm)	Ethylbenzene (ppm)	Xylenes (ppm)	MTBE (ppm)	DIPE (ppm)	TAME (ppm)	ETBE (ppm)	TBA (ppm)	TPHd (ppm)	TPHmo (ppm)	Cadmium (ppm)	Chromium (ppm)	Lead (ppm)	Nickel (ppm)	Zinc (ppm)
MW-1 @ 4'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	61	ND < 10	71	56
MW-1 @ 8'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	68	ND < 10	60	50
MW-1 @ 12'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	51	ND < 10	69	53
MW-1 @ 16'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	41	ND < 10	60	47
MW-1 @ 19'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	67	ND < 10	68	56
MW-1 @ 23'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	68	ND < 10	69	53
MW-1 @ 25'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	60	11	75	67
MW-1 @ 30'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	76	ND < 10	91	56
MW-1 @ 36'	MW-1	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	62	ND < 10	72	63
MW-2 @ 4'	MW-2	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	54	ND < 10	36	45
MW-2 @ 7'	MW-2	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	50	ND < 10	43	43
MW-2 @ 11'	MW-2	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	41	ND < 10	62	50
MW-2 @ 15'	MW-2	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	75	ND < 10	71	53
MW-2 @ 19'	MW-2	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	55	ND < 10	68	58
MW-2 @ 24'	MW-2	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	48	ND < 10	65	57
MW-2 @ 28'	MW-2	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	53	ND < 10	64	62
MW-3 @ 4'	MW-3	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	59	12	60	56
MW-3 @ 8'	MW-3	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	1.6	16	ND < 2.0	54	ND < 10	60	55
MW-3 @ 12'	MW-3	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	58	ND < 10	74	56
MW-3 @ 16'	MW-3	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	65	ND < 10	75	60
MW-3 @ 20'	MW-3	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	63	ND < 10	70	58
MW-3 @ 24'	MW-3	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	62	ND < 10	61	52
MW-3 @ 28'	MW-3	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	54	10	69	56
MW-3 @ 35'	MW-3	9/6/2005	ND < 1.0	ND < 0.0050	ND < 0.0050	ND < 0.0050	ND < 0.0150	ND < 0.025	ND < 0.020	ND < 0.020	ND < 0.020	ND < 0.50	ND < 1.0	ND < 10	ND < 2.0	51	ND < 10	76	59

Notes:

TPHg: Total petroleum hydrocarbons as gasoline.

MTBE: Methyl tertiary butyl ether

DIPE: Diisopropyl Ether

TAME: Tertiary amyl methyl ether

ETBE: Ethyl tertiary butyl ether

TPHd: Total petroleum hydrocarbons as diesel

TPHmo: Total petroleum hydrocarbon as motor oil

DBE: 1,2-Dibromoethane

DCE: 1,2-Dichloroethane

TBA: Tertiary butanol

TPHC: Total Petroleum Hydrocarbons

ppm: parts per million = µg/g = mg/kg = 1000 µg/kg

ND: Not detected: Sample was detected at or below the method detection limit as shown.

**Table 2**  
**Groundwater Analytical Results**  
 Reveles Property  
 1503 South Main Street  
 Fortuna, California 95540

Sample ID	Sample Location	Sample Date	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Ethylbenzene (ppb)	Xylenes (ppb)	MTBE (ppb)	DIPE (ppb)	TAME (ppb)	ETBE (ppb)	TBA (ppb)	DBE (ppb)	DCE (ppb)	TPHC/ Gas (ppb)	TPHC/ Gas (IR) (ppb)	TPHd (ppb)	TPHmo (ppb)	Cd (ppb)	Ch (ppb)	Pb (ppb)	Ni (ppb)	Zn (ppb)
#1 Water	Waste Oil UST Pit	1/10/1990	----	490	970	ND < 100	570	----	----	----	----	----	----	----	----	ND < 1	----	----	----	----	----	----	----
#2,3 Water	Gas UST Pit	1/10/1990	----	320	640	240	820	----	----	----	----	----	----	----	20,000	----	----	----	----	----	----	----	----
TempW-1	TW-1	12/13/2001	33,800	638	4,700	899	5,660	301	ND < 50	162	ND < 10,000	ND < 100	ND < 50	ND < 50	----	----	----	----	----	----	----	----	----
TempW-2	TW-2	12/13/2001	18,200	182	2,800	239	2,060	122	ND < 0.5	46.8	ND < 0.5	ND < 100	4.6	ND < 0.5	----	----	----	----	----	----	----	----	----

Notes:

TPHg: Total petroleum hydrocarbons as gasoline.

MTBE: Methyl tertiary butyl ether

DIPE: Diisopropyl ether

TAME: Tertiary amyl methyl ether

ETBE: Ethyl tertiary butyl ether

TPHC: Total petroleum hydrocarbons.

TPHd: Total petroleum hydrocarbon as diesel

TPHmo: Total petroleum hydrocarbon as motor oil

DBE: 1,2-Dibromoethane

DCE: 1,2-Dichloroethane

TBA: Tertiary butanol

ppb: parts per billion = µg/l = .001 mg/l = 0.001 ppm.

ND: Not detected at or below the method detection limit as shown.

IR: Infrared

**Table 3**  
**Water Levels**  
 Reveles Property  
 1503 South Main Street  
 Fortuna, California 95540

Sample Location	Date	Depth to Bottom/ Feet BGS	Survey Height/ Feet Above MSL	Depth to Water/ Feet BGS	Adjusted Elevation/ Feet Above MSL
MW-2	9/6/2005	13.46	186.73	6.60	180.13
	12/9/2005	12.11	186.73	4.40	182.33
	2/26/2006	12.15	186.73	5.92	180.81

**Table 4**  
**Groundwater Analytical Results from Monitoring Wells**  
 Reveles Property  
 1503 South Main Street  
 Fortuna, California 95540

Sample Location	Sampling Event	Annual Quarter	Sample Date	TPHg (ppb)	Benzene (ppb)	Toluene (ppb)	Xylenes (ppb)	Ethylbenzene (ppb)	MTBE (ppb)	DIPE (ppb)	TAME (ppb)	ETBE (ppb)	TBA (ppb)	TPHd (ppb)	TPHmo (ppb)	Cd (ppb)	Cr (ppb)	Pb (ppb)	Ni (ppb)	Zn (ppb)
MW-2	Well Installation	3rd Quarter	9/6/2005	ND < 50	ND < 0.5	ND < 0.5	ND < 0.5	ND < 0.5	ND < 1.0	ND < 1.0	ND < 1.0	ND < 1.0	ND < 10	54	ND < 170	ND < 10	300	36	390	400
	First Quarterly	4th Quarter	12/9/2005	ND < 50	ND < 0.3	ND < 0.3	ND < 0.6	ND < 0.3	ND < 1.0	ND < 0.5	ND < 1.0	ND < 5.0	ND < 100	ND < 50	156	ND < 5.0	75	ND < 15	82	94
	Second Quarterly	1st Quarter	2/26/2006	ND < 50	ND < 0.5	ND < 0.5	ND < 1.5	ND < 0.5	ND < 1.0	ND < 0.5	ND < 5.0	ND < 5.0	ND < 50.0	ND < 50	113	ND < 5.0	43	28	46	445

Notes:

TPHg: Total petroleum hydrocarbons as gasoline

MTBE: Methyl tertiary butyl ether

DIPE: Diisopropyl Ether

TAME: Tertiary amyl methyl ether

TBA: Tertiary butanol

ETBE: Ethyl tertiary butyl ether

ppb: parts per billion =  $\mu\text{g/l} = .001 \text{ mg/l} = 0.001 \text{ ppm}$ .

ND: Not detected. Sample was detected at or below the method detection limit as shown.

Cd: Cadmium

Cr: Chromium

Pb: Lead

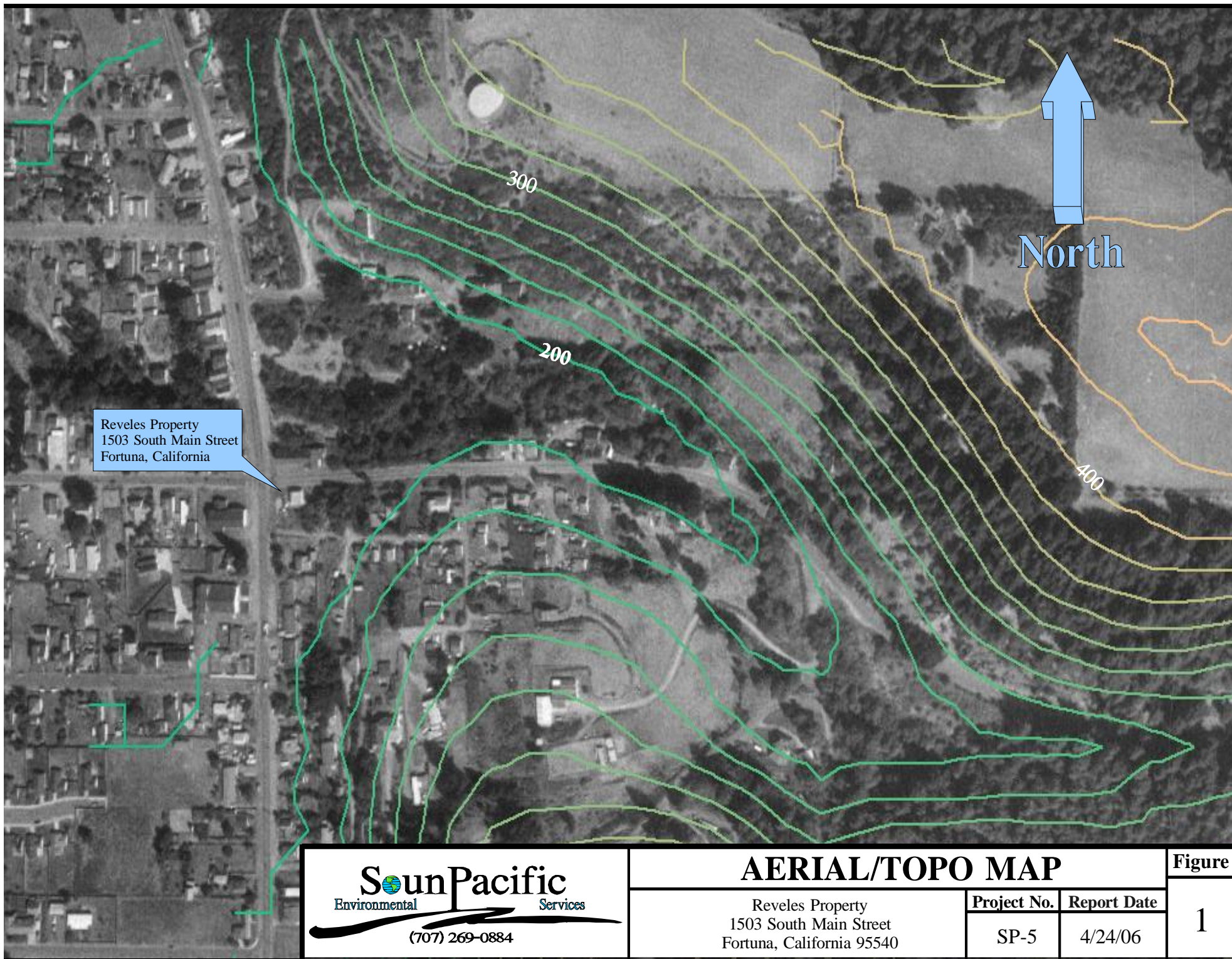
Ni: Nickel


Zn: Zinc

\* Analytical results for Volatile Organic Compounds were reported below laboratory detection limits with one exception. Sec-Butylbenzene was detected at a concentration of 0.7 ppb in well MW-2 on 12/19/05.



# Figures



 <b>Soun Pacific</b> Environmental Services (707) 269-0884	<b>AERIAL/TOPO MAP</b>		<b>Figure</b>
	Reveles Property 1503 South Main Street Fortuna, California 95540	<b>Project No.</b>	<b>Report Date</b>
		SP-5	4/24/06
			1

NORTH

MILL STREET

SOUTH MAIN STREET

MW-2

Previous Dispensers

GARAGE / SHOP

Previous Vent Lines

Toe of Slope

Previous 2,000-gallon  
Waste Oil UST Location

Previous 4,000-gallon  
Gasoline UST Locations

PL

PL

PL

## LEGEND

Water Line Underground

Overhead Electric Lines

MW-2  
Monitoring Well

0 20 40  
APPROXIMATE SCALE IN FEET



## SITE PLAN

Reveles Property  
1503 South Main Street  
Fortuna, California 95540

Project No.

SP-5

Report Date

5/1/06

Figure

2

NORTH

MILL STREET

PL

SOUTH MAIN STREET

MW-2

B-8

B-5 and TW-1

B-6

B-7

Shop

TW-2

B-4

SB-3

SB-2

SB-1

MW-1

B-3


B-2


B-1

PL

MW-3

## LEGEND

**B-1**  Soil Boring (Drilled 11/01)

**TW-1**  Temporary Well  
(Installed 11/01 & 12/01)

**SB-1**  Soil Boring (Drilled 9/05)

**MW-2**  Monitoring Well

0 20 40

APPROXIMATE SCALE IN FEET



## PREVIOUS INVESTIGATIONS

Reveles Property  
1503 South Main Street  
Fortuna, California 95540

Project No.

SP-5

Report Date

5/1/06

Figure

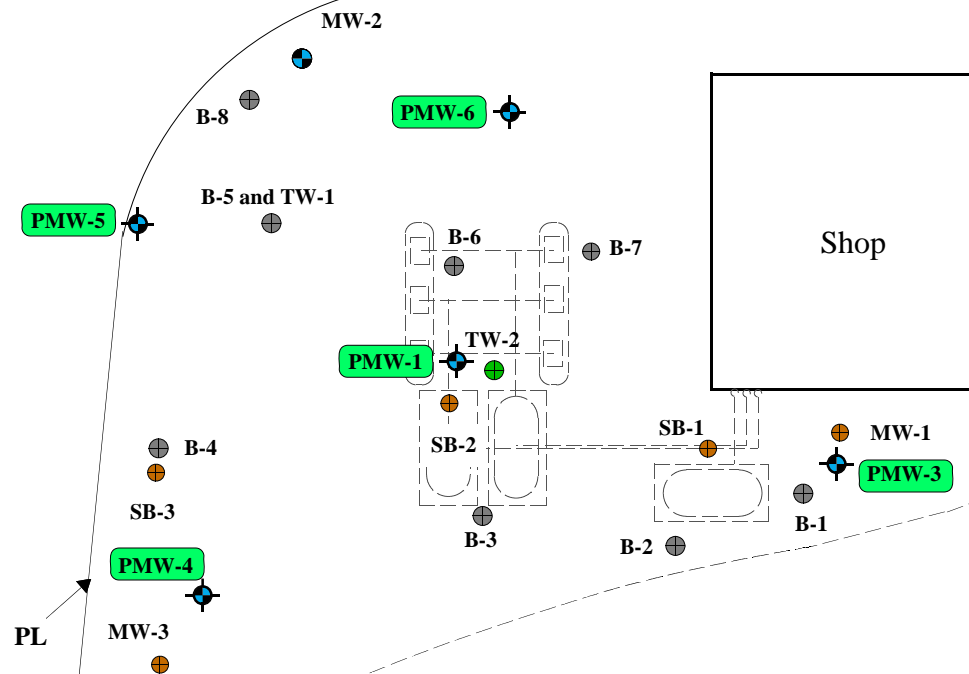
3

NORTH

MILL STREET

PL

SOUTH MAIN STREET



## LEGEND

- B-1** Soil Boring (Drilled 11/01)
- TW-1** Temporary Well (Installed 11/01 & 12/01)
- SB-1** Soil Boring (Drilled 9/05)
- MW-2** Monitoring Well
- Proposed Monitoring Well

0 20 40  
APPROXIMATE SCALE IN FEET



## PROPOSED INVESTIGATION

Reveles Property  
1503 South Main Street  
Fortuna, California 95540

Project No.  
SP-5

Report Date  
5/1/06

Figure

4



WATERPROOF WELL BOX

EXPANSION PLUG

GROUND SURFACE

CONCRETE

1'

SAND-CEMENT SLURRY

2-INCH WELL CASING

BENTONITE SEAL

1'

0.5'

APPROX 18'

0.02" MACHINE SLOTTED WELL SCREEN

LONESTAR #3 OR #2/12 SAND FILTER

15'

6" DIAMETER BOREHOLE

WELL SCREEN CAP

Drawing not to scale



## MONITORING WELL CONSTRUCTION DIAGRAM

Reveles Property  
1503 South Main Street  
Fortuna, California 95540

Project No.

SP-5

Report Date

5/1/06

Figure

5